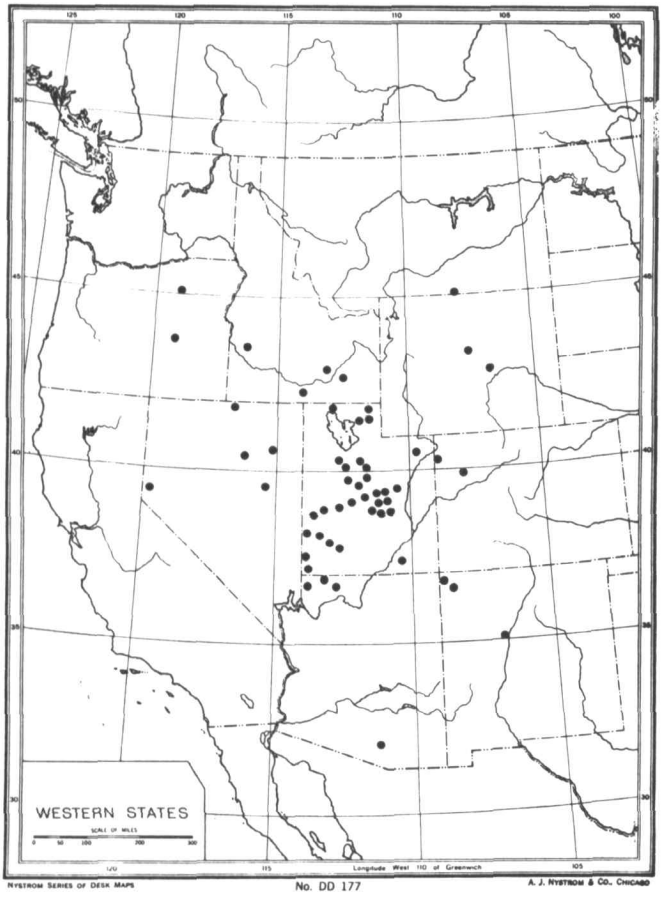
'Immigrant' Forage Kochia

R. Stevens, K.R. Jorgensen, E.D. McArthur, and J.N. Davis

Forage kochia *(Kochia prostrata)* is a semievergreen perennial subshrub introduced from southern Eurasia. Russian researchers have been evaluating forage kochia since 1928 and seeding it since 1932. On many desert and semidesert ranges, in Russia it is known as a valuable forage shrub, often associated with crested wheatgrass (Balyan 1972). It has been tested in the Western United States as a potential forage and reclamation plant for semiarid locations for more than 20 years (Keller and Bleak 1974).



Dots indicate locations where 'Immigrant' forage kochia has been successfully established by direct seeding or transplanting.

The authors: R. Stevens is project leader and wildlife biologist for the Utah Division of Wildlife Resources, Great Basin Experimental Area, Ephraim, Utah 84627. K.R. Jorgensen and J.N. Davis are wildlife biologists with the Utah Division of Wildlife Resources - K.R.J. at Ephraim and J.N.D. at the Shrub Sciences Laboratory in Provo, Utah 84601. E.D. McArthur is principal research geneticist and project leader for the USDA Forest Service Intermountain Forest and Range Experiment Station at the Shrub Sciences Laboratory.

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Origin and Development

The kochia accession 'Immigrant' was introduced into the United States as P.I. 314929 from Stavapol Botanical Gardens, USSR, May 19, 1966. In comparison with other accessions in experimental seeding trials, rangeland seedings, and on mine spoils and disturbed areas in Utah, Idaho, Nevada, Oregon, Arizona, New Mexico, and Wyoming (map 1), 'Immigrant' has a general overall superiority in longevity, forage production, forage quality, palatability, and competitiveness with annuals. 'Immigrant' was recently released to the commercial market for seed production by the USDA Soil Conservation Service, USDA Forest Service Intermountain Forest and Range Experiment Station, Utah State Division of Wildlife Resources, and the State Agricultural Experiment Stations of Arizona, Idaho, and Utah.

Performance, Characteristics, and Use

In evaluation plantings throughout the Intermountain West, 'Immigrant' has demonstrated that it is adapted to basic soils but not suitable for neutral or acid soils. Successful plantings have occurred on soils ranging from sandy loam to heavy clay, with the most successful plantings on heavier soils. 'Immigrant' develops a fibrous root system with a large deep tap root and has been established, with reproduction taking place, in areas that receive 5 to 27 inches of annual precipitation.

'Immigrant' forage kochia (arrow) established in a greasewood shadscale-winterfat community.

'Immigrant' has demonstrated its adaptability to the pinyon-juniper, basin big sagebrush, Wyoming big sagebrush, and greasewood-shadscale shrub vegetative types. Some important characteristics are: the ability to establish and persist on disturbed harsh soils, high salt and drought tolerance, tolerance of extreme temperatures (-25° to 104° F), low oxalate

levels (lower than winterfat and fourwing saltbush), ability to spread rapidly from seed, high seed production, moderate shade tolerance, good palatability for livestock and big game, food and cover for upland game birds, fair fire tolerance, compatibility with other perennials, competitiveness toward annuals, and the ability to increase fall and winter forage quality of perennial grass stands.

'Immigrant' forage kochia produces succulent branched stems annually that are gray-green to green in color. Growth starts in late March to early April. Stems are ascending to erect originating from a low woody base. Leaves are succulent, silky, filiform to linear in shape. The lower one-third of the plant remains green and succulent year around. The upper stems and seed stalks turn brown to red and dry up after seed shatter (November to December).

Sheep grazing 'Immigrant' forage kochia established on a road cut.

Protein content during winter (upper dry stems 6.1%, lower green stems 8.7%) is higher than what occurs in antelope bitterbrush, true mountain mahogany, and gambel oak. Summer protein content has been found to be over 13%. Sheep, deer, and cattle find this shrub palatable year around. Plants of 'Immigrant' have been winter and spring grazed (up to 95% utilization) for over ten years without reduction in plant density, forage production, or seed production. Grazing animals have been observed pawing through snow to get to the green base.

Once established, 'Immigrant' produces a consistent yearly seed crop. Reproduction is entirely by seed, generally in the direction of the prevailing winds, and occurs in annual as well as perennial communities. When established in annual communities such as halogeton or cheatgrass, 'Immigrant' can compete with annuals by reducing their dominance, density, forage, and seed production. In perennial communities, 'Immigrant' fills in innerspaces but has not been observed to reduce the density of established perennials.

Direct seeding on rangeland is best accomplished in the fall or winter by broadcasting on top of disturbed or undisturbed soil. If drill seeded, seed should not be seeded deeper than 1/16 inch. 'Immigrant' can be seeded in combination with other perennial species. Problems have been encountered on some rangeland seedings with obtaining consistent good stands of 'Immigrant'. Establishment problems are believed to be associated with low seed viability and improper seeding techniques. With proper seed handling and seeding techniques, good stands of 'Immigrant' can be expected.

Seed Characteristics

'Immigrant' is an early spring germinator (March), and in a laboratory will germinate in 2 to 4 days over a wide range of temperatures. Viability of at least 55% germination after 3 years of storage can be achieved by drying the seed to at least 7% moisture and storing in an air-and-moisture-tight container in cool storage (36° to 50° F). Seed stored with over 10% moisture in an open container and in an open waterhouse with fluctuating temperatures will lose over 80% of its viability in as little as 18 months.

'Immigrant' is an abundant producer of viable seed on rangelands and when grown under cultivation. Over 8 years at the Great Basin Experimental Range in Ephraim, Utah, production of combine-harvested and cleaned seed averaged 1,532 pounds per acre, with a low of 1,160 pounds and a high of 2,368. After 5 to 6 years, seed production began to decline due to the dominance, size, and woodiness of large plants. Seed production can also be reduced by competition from volunteer plants. It is recommended that to maintain seed-producing stands, plant density be controlled. Under cultivation, seed can be combine-harvested following the first heavy frost or plants can be swathed prior to the frost, dried, and seed combined out of the swath.

Under seed certification procedures, we recommend that germination be 40% and purity 70% with the bracts on the seed. There are approximately 395,000 seeds per pound (seed in bracts). Breeder plants will be maintained by the Soil Conservation Service Plant Materials Center, Aberdeen, Idaho. Recognized classes of seed will be breeder, foundation, registered, and certified. Foundation seed is available through Soil Conservation Districts, state agricultural experiment stations, and crop improvement associations.

Literature Cited

Baylan, G.A. 1972. Prostrate summer cypress and its culture in Kirghizia. Frunce, USSR: Idsatel' stovo "Kyrgyztan"; 296 p. (translated 1979, U.S. Department of Commerce, T177-59026).

Keller, W., and A.T. Bleak. 1974. *Kochia prostrata:* a shrub for western ranges? Utah Science. 35:24-25.

Wildland Shrubs

The Shrub Research Consortium is sponsoring the fourth wildland shrub symposium August 7-9, 1985, at Snowbird Resort, near Salt Lake City, Utah. The symposium, "Plant/Herbivore Interactions," will feature invited and contributed papers on aspects of plant-animal interactions with an emphasis on but not limited to vertebrate herbivores and shrub ecosystems. Contributed presentations will be 20 minutes. The proceedings will be published. If you would like to present a paper, send a title and abstract by May 15, 1985, to Dr. F.D. Provenza, Department of Range Science, College of Natural Resources, UMC 52, Utah State University, Logan, Utah 84322; for further information about the symposium and facilities, please contact Theresa A. Bigbie, Conferences and Workshop, Brigham Young University, 297 CONF, Provo, Utah 84602 (801) 378-4903.